Design Economics for the Built Environment

Impact of Sustainability on Project Evaluation

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Barry Gilbertson
Benedict Ilozor

WILEY Blackwell

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Editors

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Herbert Robinson, the lead editor, has over 20 years experience in research, consultancy, training and capacity building. He is currently a Regional Adviser and Head of Training Division at the United Nations African Institute for Economic Development and Planning (IDEP), which is part of United Nations Regional Economic Commission for Africa. Prior to joining the UN, he was Professor of Construction Economics and Project Management, and the Director of Research at the Department of the Built Environment at London South Bank University. He was also the Course Director for over 7 years of the highly reputable postgraduate Quantity Surveying programme at the University. He has held previous positions as a Senior Research Associate at Loughborough University, Research Scholar and as a UN National Expert. After graduating from the University of Reading (UK), he worked with leading international consultants Arup (UK) and in the UNDP Institutional Strengthening Project/World Bank funded project in The Gambia. He has a significant publication record including the co-authorship of several books such as *Infrastructure for the Built Environment: Global Procurement Strategies* and *Governance and Knowledge Management in Public Private Partnerships*. He is a member of the Editorial Boards of the *Journal of Financial Management for Property and Construction* and *Journal of Industrial Engineering*.

Barry Symonds
Barry Symonds, Senator h.c. (Biberach an der Riss), graduated from University College London with an MSc in Building Economics. He holds several professional qualifications (FRICS, FCIOB, FBEng, ACIAT), and is currently Managing Director of Symonds Konsult International Ltd (Education Consultants) and Associate Director for Rapid5D (BIM Solutions UK). He was previously the Head of Property, Surveying and Construction (2004–2010) at London South Bank University, UK. He is a chartered quantity surveyor and construction economist, and has worked as a partner and consultant for practices in the UK and New Zealand. He has held academic advisory roles and has been visiting professor,

lecturer, and external examiner in the UK, peninsular Malaysia, Sabah, Sarawak, Brunei, New Zealand, China, Singapore, Hong Kong, Jamaica and Germany. He is founding member of the successful MBA in International Real Estate (established 2001) at the University of Science, Biberach an der Riss. Barry has written and presented conference papers in the EU and SE Asia. He has served on many RICS committees, and held the positions of Chair of the RICS Essex Branch and QS Division and member of RICS Divisional Council. Barry is a Liveryman of the Worshipful Company of Constructors (City of London), where he is a member of the Scholarship & Awards Committee.

Prof. Barry Gilbertson
Barry Gilbertson now serves as a non-executive director for three listed companies and one private company after 15 years as a partner at PricewaterhouseCoopers (working on cases such as Canary Wharf, Wembley Stadium, Enron and Lehman Bros). An acknowledged expert in interpreting real estate markets, Barry specialises in strategic solutions for real estate within a business context, and focuses on corporate strategy and risk. Barry has a successful track record in 'borrower advocacy' cases, restoring trust between lender and borrower. Barry was the first chartered surveyor to become a partner in a firm of chartered accountants, anywhere in the world, and the 123rd RICS President in 2004/5 (inaugurating The President's Commission on Sustainability). Barry was a member of the United Nations Real Estate Advisory Group for 5 years, a member of the Bank of England's Property Forum for 10 years and a Trustee at the College of Estate Management for 8 years. He has been Visiting Professor at the University of Northumbria in Newcastle for 11 years and Visiting Professor at the Royal Agricultural University for 1 year. Barry has also been Visiting Lecturer at 20 universities around the world a member of the Council (and Court) of the University of Bath, and lead/worked on projects, or spoken at conferences, in 31 countries.

Prof. Benedict Ilozor
Benedict Ilozor teaches construction management, architecture, facilities planning, and design & management at the School of Engineering Technology, Eastern Michigan University, where he is Research & Graduate Assistants Coordinator. His teaching and research are cutting edge, and he currently works on Bendors Air Power System for electricity generation. He previously taught in Australian universities, and was Management Discipline Coordinator for Architecture and Construction Management, and head of Facilities Management for the Built Environment Research Group at the School of Architecture & Building, Deakin University. He was also Australian Coordinator for the Master of Real Estate distance education collaboration between Deakin University and University of Greenwich. He has over 100 publications (books, refereed papers and articles) on design and construction, energy, facilities space planning & management, and organisational performance. He is Regional Editor for the *Journal of Management Development*, and he is on the editorial board of several international journals.

Contributors

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John Adriaanse lectures and researches in Construction Law at London South Bank University. Before qualifying as a Barrister he had 25 years of practical

experience in the construction industry in South Africa, Namibia and in the UK. His last post before joining academia was as a legal adviser for a company active in many jurisdictions which gave him exposure to different legal systems. His research interests focuses on the relationship between the Common Law and the Standard Forms of Contract, the interaction between the law of tort, the law of contract and that of restitution based on the reversal of unjust enrichment. He is the author of *Construction Contract Law*, now in its third edition. He is also a Fellow of the Chartered Institute of Arbitrators.

Aviad Almagor
Aviad Almagor is the Director of Product Design at Vico Software. For the past decade, he has been deeply involved in developing cutting edge software solutions for the building industry. He played a vital role in the development of Vico Office – the first integrated 5D environment for the construction industry. Aviad is enthusiastic about process integration and multidisciplinary collaboration as tools to improve the efficiency and quality of the construction industry. In addition to his work on software development, Aviad has over 10 years experience in architectural design using Building Information Modelling technologies. Aviad received his Bachelor of Architecture degree from the Israel Institute of Technology and his Master of Business Administration degree from Edinburgh Business School, Heriot-Watt University.

Arthlene Amos
Arthlene Amos is a Quantity Surveyor working in the oil and gas industry in Trinidad. Her present assignment is through a secondment with bpTT where she is involved in one of the major turnaround projects for bpTT and Trinidad. She was previously a lecturer in quantity surveying and construction economics at Kingston University, London. Arthlene has experience with major UK contractors working on diverse projects including rail, building and tunnelling. She was involved in a number of major joint ventures between Costain, Veolia Water and MWH in Brighton, the most significant of these were the construction of an 11 km new sewer tunnel in Brighton, UK. She was part of the team in Costain, Laing O'Rourke, Bachy and Emcor Rail Joint Venture to upgrade St Pancras Station better known as the Channel Tunnel Rail Link project, where 13 new platforms were constructed and the existing deck extended to facilitate the Eurostar trains.

Peter Barnes
Peter Barnes is a Director of Blue Sky ADR Ltd, and has been actively involved in the construction industry for almost 40 years. In the early part of his career, Peter was a chief quantity surveyor for a building contractor, and then became head of a building contractor's construction division. After that he moved into consultancy work, specialising in contract and commercial advice, and dispute avoidance and resolution in relation to the construction industry. Peter has an MSc in Construction Law and Arbitration and is a Chartered Conservationist. Peter sits on the JCT Council, and partly as a result of that, but also because of his involvement with various other related committees, has developed a particular interest in the application of Building Information Modelling (BIM) and how the use of BIM will have an ever increasing influence on building practices over the coming years. He holds the following professional qualifications: FCIOB, MICE, MRICS, FCIArb, and MCInstCES.

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Ina Colombo is the Deputy Director of the International Institute of Refrigeration based in Paris, France. She was previously a senior researcher and lecturer in the field of sustainable refrigeration and the reduction of the greenhouse gases at London South Bank University. She is a Domestic Energy Assessor Consultant and has developed expertise in reducing the environmental and economic impact of using carbon dioxide refrigeration in retail applications. She specialised in the field of electromechanical engineering including building services, renewable energy and refrigeration to address climate change and global warming issues. Her project management experience includes the coordination of a new laboratory and an environmental chamber to support research projects on sustainability. Prior to joining academia, Ina was a Sustainability Consultant with Building Design Partnership (BDP- UK) and a Building Services Project Manager with AMEC (UK). She won the Ted Perry Award from the Institute of Refrigeration designed to encourage interest amongst bright and promising students for research of a practical nature related to the field of refrigeration.

Dr. Peter de Jong
Peter de Jong has been a lecturer in Building Economics since 2000 at the Department of Real Estate and Housing of the Faculty of Architecture and the Built Environment, Delft University of Technology in the Netherlands. His teaching speciality is on cost awareness in the design process as part of the BSc in Architecture and feasibility studies. His research focuses on life cycle costs, including supporting data classification and collection. Peter has taken part in classification of cost standards and the Dutch elemental method. Over the years, he has developed a strong interest in building informatics, building information modelling which has been a connecting thread in his career. His academic goal is to (re)define sustainable building economics with a strong focus on building quality.

Damilola Ekundayo
Damilola Ekundayo is a lecturer in Construction Economics/Quantity Surveying at Northumbria University, UK. He is currently undertaking a PhD in Sustainable Development. He graduated with an honours degree in Quantity Surveying from the Federal University of Technology Akure, Nigeria, and later undertook Masters studies in Construction Management at the University of Reading, UK where he obtained a Distinction and graduated as the best student. Before joining academia, he worked in the construction industry on multi-million pound projects in the UK and abroad. Damilola has worked on industry-funded projects and has co-authored several research publications and technical reports in the areas of construction economics, project management, environmental sustainability and built environment education. He is a board member of several reputable, peer-reviewed journals. Damilola is a recipient of scholarly and industry awards including the CIOB Certificate of Excellence Award. He is a Member of the CIOB, an Associate of the RICS and a Fellow of the Higher Education Academy.

Paul Farey
Paul Farey is a Director and Head of AECOM's Fiscal Incentives team in Europe (formerly Davis Langdon/NBW Crosher & James). A Quantity Surveyor by training, he worked for contracting organisations and in private practice before joining the team in 1997 because 'Quantity Surveying was a bit too exciting'.

Dual-qualified as a Chartered Surveyor and Taxation Technician he leads the firm's client tax service offer of Capital Allowances, Land Remediation Relief, VAT, R&D Credits and international tax depreciation advice. Paul has worked on numerous projects, across all sectors in the UK, Singapore and Malaysia. He is a Fellow of the Royal Institution of Chartered Surveyors (FRICS) and a regular speaker on property-related tax matters and has completed the College of Estate Management's *Sustainability for Real Estate Investment* course.

Victoria Hardy
Victoria Hardy is the CEO of the Star Island Corporation, a New Hampshire not-for-profit organisation that manages a 35 building conference complex on an island 8 miles off the coast. Prior to her appointment as CEO, Victoria served as the Academic Department Head of Design and Facilities at Wentworth Institute of Technology. Before joining Wentworth, she was the primary tenured Facility Management faculty at Ferris State University for almost 10 years. She also spent 20 years managing arts programmes and facilities at Stanford University, in the Meadowlands in New Jersey, and in Detroit, in addition to consulting in the arts and entertainment industry. Victoria Hardy was named the International Facility Management Association (IFMA) Distinguished Member of the Year for 2005 and was selected in 2001 as the IFMA Distinguished Educator. She holds a BSc, a Master's Degree in Management, and is a graduate of the Stanford Management Development Programme.

James Hayhoe
James Hayhoe studied at Southampton Business School and graduated with a first-class honours degree in Business with Entrepreneurship in 2007. It was during this time that he developed an interest in how terrorist threats were managed by businesses and in the built environment. James worked in a number of security sensitive environments which developed his understanding of risk management through passive and overt threat mitigation. As his career moved towards the construction sector, James developed his academic credentials by achieving a Master's Degree in Quantity Surveying from London South Bank University. This culminated in the submission of his MSc thesis entitled 'Cost and design considerations for tall buildings: managing the evolving threat of terrorism'. James maintains a keen interest in the evolution of high rise developments and their management of threats. He is employed as a Quantity Surveyor in London working on a wide variety of high profile commercial, residential and government funded projects across the UK.

Dr. Ann Heywood
Ann Heywood graduated from Bedford College, University of London with a first-class honours degree. She holds a PhD from the University of Salford. Ann was formerly Principal of the College of Estate Management (CEM), the leading not-for-profit supported e-learning provider for the property and construction sectors, with 3500 students in 100 countries. She was previously in private practice and was elected Green Surveyor of the Year by RICS in 1998 for her work in balancing the competing environmental, land use and financial needs of land portfolios. Before joining CEM, she worked in consultancy, specialising in sustainability and corporate social responsibility. She advised clients on the sustainability credentials of development projects, corporate responsibilities and staff training. Ann was previously managing partner of CPM, a company specialising in environmental consultancy. She successfully chaired the RICS Presidential

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Malgorzata Jacewicz
Malgorzata Jacewicz has a Master of Arts degree in Industrial Design and prototyping. She is also qualified in architecture. Since 2010, she has been CEO of Hold Foundation C.I.C. During her postgraduate research project at Technical University Delft, Hyperbody Research Group in 2008 she developed in collaboration with a community group activity based design principles of a socio-economic framework to generate positive collaborative changes and therefore reduction in the communities' impact on the environment. In 2009, *Architects' Journal* published her graduation project in architecture 'Paris Galaxy', Boidus Architectural Blogg publication 'How big can you think?'. In 2011, she expanded the socio-economic model of loop based systems as an alternative to the current one, proposing a new ownership model based on the relationship between leasing and recycling. In 2012, the Technology Strategy Board recognised her for innovation in a building design proposal 'Kit of Parts'" further investigating loop system solutions and economic viability of modular systems.

Rotimi Joseph
Rotimi Joseph is a Chartered Quantity Surveyor and Chartered Builder with over 10 year experience as a cost consultant and expert on flood damage properties reinstatement works. He is currently working for Cunningham Lindsey UK and completing his doctorate degree in the Department of Architecture and the Built Environment at the University of the West of England, Bristol. His research interest is in cost–benefit analysis of property level flood risk adaptation measures.

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Jessica Lamond is a Senior Research Fellow at the University of the West of England and member of the Centre for Floods Communities and Resilience. Jessica's research interests are in adaptation of the built environment to reduce the risk of flooding in an era of climate change including property level adaptation, sustainable urban drainage and insurance and she is co-editor/co-author of three books in the field.

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Sean Lockie is the Director and Head of Sustainability and Carbon Management at Faithful + Gould. He holds a Bachelor of Arts, Bachelor of Planning and Resource Management, an MSc in Sustainability, and professional membership qualifications (MBIFM, MRICS). Sean has nearly 20 years experience in the sustainability area providing policy and project advice to a wide range of clients. He has written over 50 publications in the carbon and sustainability area. Sean is chair of the Environmental Industries Commission's Sustainable Buildings Group, an environmental columnist in *Construction News* and an advisor on the BRE Global standing panel.

Prof. David Lorenz
David Lorenz is the Director of Lorenz Property Advisors, a property valuation and strategic sustainability consulting firm located in South Germany. David has over 10 years of practical experience in valuation, consulting, estates management and property development. Since April 2012, David has also been Professor for Property Valuation and Sustainability at the Faculty of Economics

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Prof. Thomas Lützkendorf
Thomas Lützkendorf is Chair of Sustainable Management of Housing and Real Estate at the Karlsruhe Institute of Technology (KIT). He is interested in the integration of sustainability issues into decision making processes for the life cycle of buildings, the relationships between buildings' environmental quality and economic advantages. Through long standing co-operation with architects and designers, he is also familiar with the topics and problems concerning the integration of sustainability issues into the design and planning process. He is a member and scientific consultant of the 'roundtable on sustainable building' at the German Federal Ministry of Transport, Building and Urban Affairs. In addition, he is a founding member of the International Initiative for a Sustainable Built Environment (iiSBE) and he is actively involved in various standardisation activities at the national, European and international level.

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Shamil Naoum is a Reader at London South Bank University. He received a BSc in Building and Construction Engineering from the University of Technology in Baghdad, an MSc in Construction Management and Economics from the University of Aston in Birmingham, and a PhD in Construction Management from Brunel University in Uxbridge. Before beginning his academic career, he worked in the construction industry as a site engineer and project manager. He is a member of the Chartered Institute of Building and the American Society of Civil Engineers. He has considerable research experience in construction management areas such as procurement methods, site productivity, human resources management and management science. He supervises PhD and postgraduate students researching construction management problems and has published papers in many international conferences and scholarly journals including: *American Society of Civil Engineers* (USA); *International Journal of Project Management* (UK); *Journal of Engineering Construction and Architectural Management* (UK); and *Chartered Institute of Building* (UK).

John Pearson
John Pearson is a Chartered Quantity Surveyor (FRICS) and has spent 36 years working and teaching within the construction industry. During the 1970s and 1980s he worked for Private Practice and for Consultant Civil Engineers, both in the UK and Finland. Since 1987 he has been a principal lecturer at Northumbria University and has held a number of responsibilities including managing Quantity Surveying research. As an active member of the UK Green Party, John is a keen public speaker on the importance of sustainable construction and is very conscious of the need to instil awareness of this in future construction professionals. At Northumbria University, he teaches in a range of subjects and makes every effort to identify the relevance of sustainability. In addition he has supervised both undergraduate and Master's Dissertations in this area. John also has a degree in Law (LLB) and a master's degree in Education (MEd).

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Andrea Pelzeter studied architecture at the University of Stuttgart in Germany. She worked as an architect in the field of construction and revitalisation. In 2002, she began her postgraduate studies in the field of business administration and real estate at the International Real Estate Business School (IREBS). She started as a research assistant at IREBS and in 2006 pursued her doctoral studies at the European Business School (EBS), International University Schloss Reichartshausen. Her research topic was 'Life-cycle costs of real estate: the influence of location, design and environment'. She founded her consulting agency Pelzeter Lebenszyklus-Management (Lifecycle-Management) in 2006. Since 2007 she has held a Professorship for General Business Administration, particularly Facility Management, at the Department of Cooperative Studies at the Berlin School of Economics and Law (HWR Berlin). She is the author of numerous publications on sustainable development in facilities management and building optimisation with life cycle costing.

Prof. Srinath Perera
Srinath Perera is the Chair and Professor of Construction Economics at Northumbria University, Newcastle upon Tyne. He has over 25 years' experience working as a consultant Quantity Surveyor, Project Manager and lecturer. He is a chartered surveyor and a member of both the Royal Institution of Chartered Surveyors and the Australian Institute of Quantity Surveyors. He presently leads the Construction Economics and Management Research group at the Faculty of Engineering & Environment of Northumbria University. His main research interests are in the broad field of Construction Economics covering, risk and value management, cost planning and management, innovation management; sustainability: whole life costing, cost–benefit analysis, carbon estimating; e-business: ICT in construction, e-procurement, decision support and knowledge based systems; professional education. He is currently a coordinator of the e-Business in Construction, task group TG83 of the CIB.

David Picken
David Picken is a Fellow of the Royal Institution of Chartered Surveyors and the Australian Institute of Quantity Surveyors. After university David worked as a volunteer on an aid project in Papua New Guinea. He joined a firm of consultant quantity surveyors in Adelaide in 1973, and held similar positions in the UK and Saudi Arabia. His academic career began at The Hong Kong Polytechnic University in 1979. He completed a research Masters at the University of Salford in life cycle costing in 1989, and studied value engineering practices during a placement with the Hanscomb Group in the USA in 1994. From 1995 to 2009, he taught at the School of Architecture and Building at Deakin University (Australia). His publications include textbooks for measurement practice and papers on design and construction economics in international refereed journals. His teaching was recognised by awards for excellence and outstanding achievement. He is now an adjunct teaching fellow at Bond University in Queensland. David's research interests focus on design economics, procurement and risk management.

Richard Powell
Richard Powell is a Senior Cost Manager with Turner & Townsend Cost Management, a leading international construction consultancy company. He chose quantity surveying as a career as he was attracted to having the on-site experience.

Richard successfully achieved a first-class honours degree in the Quantity Surveying Consultancy course at Kingston University. For the early part of his career Richard was mainly involved within the public sector supporting projects from school extensions to health centres. He then rose to the challenge on the prestigious Heathrow Terminal 5 project for 2 years prior to playing a key role within the cost management of a food retail account. As a chartered surveyor, he now leads the commercial management for a major retail banking client on the refurbishment of their branch network. Richard is passionate about first-class service delivery and passing his knowledge onto those undertaking their RICS APC.

Prof. David Proverbs
David Proverbs is Professor of Construction Management and presently Head of the Department of Architecture and the Built Environment and co-Director of the Centre for Floods, Communities and Resilience at the University of the West of England, Bristol. He is Chair of the Council of Heads of the Built Environment (CHOBE) in the UK, a member of the CIOB Educational Committee and a member of the RICS UK Education Standards Board. He has undertaken numerous research projects, both for industry and the government. Research funding has been secured from the research councils, and various public and private sponsors. Areas of research specialism within flood risk management issues include adaptation to flood risk, damage assessment, flood repair and flood resilience. He is Co-Editor of the *Structural Survey: Journal of Building Pathology and Refurbishment*; and the *International Journal of Sustainable Development and Planning*.

Jon Scott
Jon Scott is a Senior Cost Manager at Bruce Shaw, a multidisciplinary consultancy with both UK and international offices. Jon is a chartered surveyor; originally an Economics graduate with an MSc in Quantity Surveying. He has over 10 years' experience across a number of private firms including Cyril Sweett – a leading international construction consultancy. His experience includes a variety of sectors including residential, commercial, retail and PPP sectors, both in the UK and France. This experience includes the responsibility for cost planning from the inception of many different projects. He is currently working on a number of high specification residential projects in both London and Paris with Bruce Shaw. Jon has previously undertaken published research on Operational Private Finance Initiative projects and the payment mechanism.

Dr. Ian Selby
Ian Selby graduated from the University of Wales Aberystwyth in 1990 with a BSc (Econ.) Hons in International Politics. He then read an MPhil (1992) and PhD at University of Cambridge (1998). During the 1990s he worked for various public and private sector organisations developing research and public affairs activities, and led a research and marketing department for a major UK media organisation between 1998 and 2000. In 2000, he took up his first post in the built environment sector at the British Council for Offices, where he was responsible for establishing the research and public affairs department, which he subsequently led between 2002 and 2008 as Director of Research & Public Policy. He is currently the Research Director at The College of Estate Management. He has managed major research projects on flooding, and grey water usage in the UK housing sector. He has been a member of HMG committees, including the ODPM's Working Party on Decontamination of

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John Symes-Thompson
John Symes-Thompson has built up over 30 years of experience in the commercial property investment markets, including 11 years at ING Real Estate in a fund management role, and 3 years at CBRE in investment agency. He joined CBRE in October 2005 as a Senior Director in the Capital Markets Division, but moved over to the Investment Valuation team in 2008 where he is able to bring his market experience and knowledge to the table for key institutional clients. He is currently the lead valuer for Standard Life Assurance, UBS Global Asset Management, BAE Systems Pension Trustees, Royal Bank of Scotland Pension Fund, Lothian Pension Fund, Mountgrange and Santander Pension Trustees in the UK. On the corporate side his clients include Sports Direct, BHS plc. and Arcadia Group. He has a specialist knowledge and interest in sustainability issues and is a member of the IPD ECOPAS Steering Group and the RICS Valuation Working Group on Sustainability.

Dr. Chika Udeaja
Chika Udeaja graduated as a Civil Engineer and worked briefly as a site engineer and design engineer before undertaking postgraduate studies in Concrete Structures at Imperial College London. This was followed by a brief assignment as a bridge engineer in Malaysia before he returned to the UK, to undertake a PhD in Construction Management at the London South Bank University. On completion of his PhD in 2003, he joined the University of Newcastle as a researcher, and was involved in developing CAPRIKON and other research projects. He is currently a senior lecturer in the Faculty of Engineering and Environment at Northumbria University. He teaches procurement, technology, and sustainability to future generations. His main research interests are in construction management and information technology. More recently, he has become increasingly involved in innovative product and process management looking at how modern construction management techniques and sustainable technologies can be used to deliver government and industry targets on improving efficiency and reducing carbon emissions.

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Paul Ullmer is a Quantity Surveyor with EC Harris, a leading international built asset consultancy company which is part of ARCADIS, a leading global engineering and consultancy firm, providing consultancy, design, engineering and management services.

Prof. J.W.F. Hans Wamelink
J.W.F. Hans Wamelink has been the Professor of Design and Construction Management in the Faculty of Architecture and the Built Environment, Department of Real Estate and Housing, Delft University of Technology since April 2006. The educational and research activities of his Chair intend to empower professionals and organisations in the AEC industry with new processes and business models which integrate knowledge, organisations and procurement to deliver innovative building projects, and the sustainable renewal of the built environment. The Chair

takes care of the education in the bachelor degree as well as in the master's degree programmes. Apart from his role as a professor, he was owner–director of Infocus and a consultant at DHV, both companies specialised in consultancy and building management. After finishing his PhD at the Delft University of Technology he worked for 10 years as an Assistant Professor at the Faculty of Technology Management of the Eindhoven University of Technology in the Netherlands.

Dr. Lei Zhou
Lei Zhou is a lecturer in Construction Economics at the Faculty of Engineering and Environment, Northumbria University, UK. He is a columnist for *International Journal of Project Contracting & Labour Service*. He graduated from Heriot-Watt University with an honours degree in Building Economics and Quantity Surveying. He obtained an MPhil degree in sustainable construction from the University of Manchester. He further gained a PhD degree from Oxford Brookes University in the UK in 2009. He has expertise in Project Finance and Investment, Low Carbon City and Sustainable Construction, Quantity Surveying, Construction E-business and Public Project Management and Auditing.

Foreword

With continuing pressure and innovation in the built environment of today, and with more people now living in cities than in the history of mankind, getting that environment to be an exciting, vibrant, sustainable and cost effective place for communities, occupiers, as well as clients, has never been more important. Understanding design economics is critical to help deliver this vision around the globe, and to enable qualified professionals to provide effective and well considered advice in land, property and construction.

In *Design Economics for the Built Environment,* the Editors, Professor Herbert Robinson, Barry Symonds, Professor Barry Gilbertson and Professor Benedict Ilozor, are unquestionably well recognised professionals in providing such advice around the world. They, together with an expert team of academics and practitioners, bring the theory and practice alive for the reader. Collectively, they are to be congratulated on what has been a challenging task to pull together the latest thinking in such a well informed and coherent way. This is a hugely credible book, providing evidence of the importance of striking the right balance between theories and practices leading to a relevant and robust built environment of the future. It is incredibly well structured and thought through, as you would expect with such a prestigious roll call of academics and practitioners on the contributor list:

- In Part I, all the key elements necessary for effective design economics from an up-to-date view on the theories, principles, concepts and approaches to design economics. Important developments such as the new rules of measurement, new processes for productivity and efficiency, innovation and technologies including BIM, whole life sustainable costing, fiscal policies and incentives for achieving sustainability in design, effective procurement and sustainability tools (including BREEAM and LEED), sustainable communities, flooding risks and cost of mitigation all feature with many of the world's academic experts sharing their words of wisdom.
- Part II makes the theory come alive through practitioners sharing their experience through industry perspectives, practical examples and case studies. Key elements from Part I are unpacked to reinforce the theories and principles

learned and the implications of delivering value for money alongside the need to balance environmental, economic and social pressures of today's construction industry.

So wherever you are in the world, this is a lively and refreshing up-to-date view of design economics in terms of acting as a core enabler for delivering sustainable buildings and infrastructure projects. Whether you are currently studying for a related degree, are a practitioner or influencer in the field, this book will have something for you. I only wish something so well considered that conjoins the latest academic thinking with the practicalities of the built environment were available when I was studying.

It is a huge privilege to be asked to write the foreword for this book, with so many of those I have known in the industry involved in editing or contributing. All I can say is that it has to be worth a read. Design economics is the only thing that can influence the future of the built environment and with countries like India set to build the equivalent of a Chicago every year for the next 26 years, getting this right now is paramount for creating the best environment possible for the generations to come. If you are set to read this book you do so I am sure as a potential key contributor to the built environment now or for the future – there is no question this book will set you up with the latest thinking you require.

Amanda Clack
MSc BSc FRICS FAPM FIMC CMC Affiliate ICAEW
Vice President of the Royal Institution of Chartered Surveyors and
Partner at PricewaterhouseCoopers

Preface

The drive towards low carbon economy, zero carbon buildings and environmentally friendly infrastructure means that there is a growing interest to design in a way that reflects sustainability principles of balancing economic, social and environmental factors. Design economists are increasingly called upon to respond to new and complex challenges by providing solutions that deliver value for money for clients within the constraints of balancing the environmental, economic and social factors in the development process. The unifying theme throughout the book is therefore how to respond to the increasing social, economic and environmental pressure as a result of changes in regulations and clients' priorities to address emerging challenges in the built environment. Previous books on design economics are either too out-dated, or narrowly focused, on exploring the relationship between fundamental design variables relating to geometry in terms of size, shape, arrangement, height and their effects on capital costs. There have been a number of significant books written on the subject over the past decades. The *Economics of Building* by Herbert W. Robinson published in 1939 was the first book to be devoted entirely to the economic aspects of building. This book was a condensation of the author's PhD thesis written at the London School of Economics and was followed by other significant publications including Ivor Seeley's popular book on *Building Economics* in 1972.

However, it is now recognised that design economics should focus on a wide range of issues affecting construction costs and value from a user, buyer or tenant perspective within a changing policy environment and regulatory framework. This book presents new directions and perspectives reflecting the need to recognise the importance of climate change and sustainability in project design. Considerable attention is therefore given to design factors influencing sustainability and environmental externalities, life cycles of buildings with carbon emission treated as external costs, productivity and efficiency, taxation, monetary and fiscal policies, and other fiscal incentives (e.g. levies, reliefs and capital allowances), affect design and construction costs. Attention is also devoted to emerging issues such as the development of assessment frameworks to reduce the environmental costs of design, flooding risks and mitigation, cost implications of terrorism and similar explosive threats, new processes, innovation and technologies such as

Building Information Modelling, knowledge management systems, role of education and their impact on in improving productivity and efficiency of the design process to reduce both project duration and costs.

This book explores the theories, principles of design economics and how it is applied in the construction industry. It is carefully structured into two parts. Part I provides the context and discusses key theories and principles of design economics. Part II focuses on the application of the theories, principles and approaches in Part I by presenting practical examples, case studies as well as tools and frameworks used to achieve creativity resulting in sustainable design outcomes. This approach of integrating theory and principles with practice, tools and case studies provides a better understanding of the linkages between theories and principles of design economics to industry practices leading to a greater appreciation of the discipline of design economics and its increasingly important role in addressing critical economic, social and environmental challenges faced by clients of the construction industry today.

As editors, it has been a long and challenging process but a rewarding journey to put a book of this nature and complexity together. We want to take this opportunity to register our deepest appreciation to all the contributors from academia and industry. We also recognise that the book we are producing is at a time when there are unprecedented changes in the construction industry. The blend of invaluable contribution from academia and industry has made this book unique in many ways. The principles, industry case studies and practical tools incorporated are useful for final year and postgraduate students in design and architecture, construction management, facilities management, quantity surveying, engineering and project management, as well as government policy makers, consultants, contractors and advisers to client organisations. The book will enable both students and practitioners to explore and understand the multiplicity of factors that contribute to efficient design which can reduce both the capital and operating costs of buildings and infrastructure projects and minimise the environmental and social costs to society. Finally, we want to thank Madeleine Metcalfe and her team of editorial assistants and publishers at Wiley-Blackwell for their encouragement and patience in putting this book together.

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